A Datapro Feature Report

How to Evaluate a Personal Computer for Word Processing Applications

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DATAPRO RESEARCH CORPORATION 1805 Underwood Boulevard Delran, New Jersey 08075, (609) 764-0100

How To Evaluate a Personal Computer for Word Processing Applications

The Commodore CBM computer being used for word processing in a law office.

Word processing is one of the most popular applications for personal computers. The reason for this may primarily be one of economy, but how do microcomputer WP systems actually compare with more expensive, dedicated word processors? Also, how do you evaluate a personal computer for your word processing needs? This report is designed to explain the advantages and disadvantages of micros for text processing and to offer some sound advice on the selection of a system. The report provides criteria for examining the hardware, software and documentation of a system, and discusses the general usefulness of personal computers for this application. A worksheet for actually testing a personal computer system for word processing is offered at the conclusion of the report.

No matter what a person considers to be their prime application for a personal computer, they almost always want a word processing package in addition to whatever else they're doing. There are even those folks who, finding they are unable to spend upwards of $6,000 for a specially designed word processing system, settle for a less expensive microcomputer to do only word processing. Whether they are misguided or not is not the issue of this report. The fact remains that there is probably more interest in word processing software than in any other generic software category for personal computers. This report will discuss the relative merits of using a personal computer for WP, provide some cautions to the prospective buyer and some guidelines if you're in the market to land that one special system that will solve all of your text processing needs.

There are three broad categories of word processing systems we can identify. Each is peculiar to its own working environment and has special advantages and disadvantages.

Mainframe Computers and Minicomputers with Word Processing Software—Systems that are designed to run word processing as an application on an existing mainframe or minicomputer. In this case, word processing would never be the primary application of the mainframe/minicomputer and would generally provide only fundamental text processing features to those who use the computer for traditional DP tasks most of the time. This type of word processing generally is only a small portion of a mainframe's activity and is found in DP-intensive operations where computers are used on a routine basis by technical and support people. If the computer is being tied-up by word processing more than 25% of the time (even less on a large mainframe), someone should go down to the computer room and wake some people up. This is currently the least desirable word processing alternative but acceptable if the company refuses to buy you a typewriter. Future systems may permit the easy integration of text and data files, which may make this choice seem much more attractive. Primary problems are poor word processing features, complicated system commands, and poorly designed terminals that are not comfortable to use for extended typing assignments.

Dedicated Word Processors—Systems designed and marketed solely as word processors. Although in many cases they employ the same microprocessors found in personal computers, these systems have been artfully programmed to perform an array of text manipulations. In some instances, the word processor has been designed specifically for text processing purposes with a special programming language. These systems are the most familiar ones and employ very good software for state-of-the-art text processing features. These systems are also designed with human beings (not computers) in mind and are the friendliest on the market. Prices begin around $6,000 and edge or leap upwards depending on sophistication and number of workstations.

Personal Computers with Word Processing Software—Systems designed to provide limited computing and word processing capabilities to a user. Personal computers, or microcomputers, have created more than one revolution. Not only are they beginning to supplant the use of minicomputers and mainframes, but because of their relatively low cost, they have cut-into the programmable calculator and word processing markets. Software for personal computers may be good or bad, just as with any larger system. There are some inherent problems, however, in trying to use a personal computer for word processing. These include poorly designed hardware and software, hidden or unexpected expenses in trying to get a system to do what you want, reliability and ease of use. For under $6,000, though,—and sometimes more like $3,000—you can't beat the price. And that's the tragedy because many folks are led into the flowery micro-

How To Evaluate a Personal Computer for Word Processing Applications

SYSTEM TYPE	WORD PROCESSING FEATURES	WORKSTATION DESIGN	EASE OF USE	VOLUME CAPABILITIES	CONFIGURATION	EXPENSE
Dedicated Word Processor	Excellent. Practical and useful.	The most advanced. Comfortable.	Easy to use.	Low, medium and high volumes can all be justified.	Standalone, shared-logic or distributed processing.	Moderate ($6,000+)
Mainframes and Minicomputers	Poor to good. Just the basics.	DP terminals do not good WP terminals make.	Moderately to very difficult to use.	Low to slightly more than low. Otherwise not very cost effective.	Shared logic or distributed processing.	High ($25,000+)
Personal Computers	Good to Excellent. Slightly practical.	Many a kludge shall you meet.	Moderately difficult to use.	Low to medium.	Standalone	Low (under $6,000)

Figure 1. The relative feaures of various types of word processing systems.

computer pastures only to find a swarm of software locusts ready to consume their energy and effort like so many kernels of corn on the defenseless stalk. There is hope, however, and there are some inviting systems out there so long as you know what you're getting into. Personal computers for word processing are the subject of this report.

Figure 1 depicts some of the preceding characteristics of the various types of word processing systems in chart form.

WORD PROCESSING APPLICATIONS—WHAT ARE THEY?

In the early days of word processing, the strongest advocates of it were service-oriented companies who regularly manipulated paper, and who considered paperwork costs to be equivalent to a manufacturing organization's production costs. Such paper-intensive organizations include the government, insurance companies, banks, law offices, and medical/health care groups. Much of what has been learned about word processing came as a direct result of experience in these fields.

What are some typical word processing applications? Consider the following.

- Form Letters—The ability to produce large quantities of personalized form letters which can variably change such information as the name and address of the recipient, the date, or even specific information contained within paragraphs of a letter.

- Letter and Memo Typing—While letters and memos do not always require the use of a word processor, the automation of such clerical work is reasonable when you are dealing in many multiples for internal distribution (and the photocopier won't do), variable information for a number of recipients of a memo, or with information that may have to be revised in the future.

- Document Creation—The writing and editing of long documents is the most widely used application for word processing. This can apply to any number of applications, from writing a novel, to doing movie reviews, to supplying program notes for the next PTA meeting. Word processing not only expedites the writing and editing process, it also permits one to easily revise existing material.

- Records Processing—In data processing, this is called list processing. It is the creation of a data base of formatted information that can be amended at any time and sorted in a number of ways. One could, for example, catalog a library full of books and then go into the system and ask it to alphabetize the list or perform a unique sort like finding all the books produced by one particular publisher.

- Forms & Statistical Work—Word processing systems can often be asked to store required formats to automate the completion of special forms or the creation of special reports for technical applications. These are some of the attractive uses that intrigued such industries as insurance, banking and medical/health care.

In the end, a word processor should be able to do anything you wish to do with the written word. You should look at systems while keeping your applications firmly in mind, testing them to determine their general usefulness for your needs.

WHAT MAKES A GOOD WORD PROCESSOR?

In order to discuss the relative merits of using a personal computer for word processing, we should begin by explaining what is most desirable in a WP system. Consider the following.

- Hardware Design—The quality and durability of the system hardware should be adequate to handle text processing applications. The size of the microprocessor must be large enough to store and manipulate healthy

How To Evaluate a Personal Computer for Word Processing Applications

chunks of information, and the processors should be fast enough to expedite common word processing functions such as character searches and text alignment.

- Ergonomic Hardware Features—Systems should be designed with "comfort" factors in mind. These include the size and aesthetic features of the display screen, the feel and layout of the keyboard, the physical size and design of the cabinetry and components (tilting screen, detached keyboard, glare reduction etc.), and the noise level of the printer.

- Software Features—Software should be easy to understand, useful and uncomplicated. Taken into consideration should be the overall thoroughness of system features, the practical nature of feature implementation, and the incorporation of common sense procedures by the software designer.

- System Documentation—A system manual should be thorough, but easy to comprehend. An oft-ignored consideration, the general quality of the operator's manuals that come with a system, can truly make or break a word processor.

How do personal computers stack-up in relation to these areas of concern? Let's take a closer look in the following section.

EVALUATING A PERSONAL COMPUTER FOR WP

Personal computers for word processing are not generally sold as ready-made, turnkey systems. It is the responsibility of the user to find and test all system components prior to purchase and, with the help of the dealer, put together a system that will be adequate for the prescribed needs.

It is important to remember that the burden of responsibility rests squarely on the shoulders of the customer, not the dealer. The dealer will be helpful in making sure that all of the selected components are compatible and can be plugged into each other, but the user must become familiar with the various types of units and software that are available in order to design a system that will fulfill his or her needs.

In addressing the major areas of concern defined earlier, one simply needs to examine in detail the individual pieces of a personal computer system. Unlike higher-priced, dedicated word processing systems—which are sold as complete packages, ready-to-go (or not go)—the typical personal computer system may be composed of a variety of components from different vendors. Because of this, it is much easier to identify the weaker components of a proposed system and to find alternatives. What are these components? They are as follows:

- The computer itself.

- The video display unit.

- The storage device (single or dual cassettes or floppy disks, or even Winchester disks for mass storage).

- The software which could be from the computer vendor or from an independent.

- The printer (matrix or daisywheel are the usual choices for word processing).

- Miscellaneous hardware requirements, such as special computer language circuit boards to permit the use of given software packages. One may or may not have miscellaneous needs in these areas, but the surprises can kill your budget.

We have now identified the typical components of a personal computer system as well as four broad categories of concern that relate to the evaluation of word processing systems. By putting these two sets of criteria together, we can assess the general capabilities of personal computers as word processors in all of the most important areas. The simplest method of doing this is to address each of the component areas (i.e. the computer itself, the display screen, etc.) from the general perspectives of design, quality and usefulness.

THE MICROCOMPUTER

The core of your system is the microcomputer itself. This compact, self-contained unit provides all the processing power to perform applications that are loaded into its memory via software packages. It has a keyboard, internal circuits (chips) which provide processing functions, a power supply and ports for adding peripherals like display screens, disk drives and printers.

The relative size or power of a personal computer can be judged by the following:

- Main Memory Size—The internal, electronic, semi-conductor memory of a computer is designated by the number of bytes (8-bit codes) of information it can store. This memory is volatile and will disappear when the unit is switched off. One can think of this as working memory from which information can be stored on magnetic media if desired. Memory sizes are described by notations like 24K, 48K and 64K, which denote the number of thousands of bytes which can be held in memory at any one time. Loading a software package—which is generally stored on a magnetic diskette—into the main memory of a small computer will naturally use some of this capacity and affect the amount of working memory that is still available. If a personal computer is going to be used for word processing, it should have a main memory of at least 48K.

- Bit Processing Capability—Binary digits, or bits, are used in combinations to create "words" (bit sequences or bytes) for the computer to process. Computers are designed to recognize a given word length. Eight-bit

How To Evaluate a Personal Computer for Word Processing Applications

words, or bytes, are the most common structure, and most personal computers are designed to process these. A new breed of 16-bit and even 32-bit computers, however, are beginning to appear (which will increase processing efficiency by doubling (16-bit) or quadrupling (32-bit) the ability of the computer to simultaneously process bytes of information. Such computers will naturally be faster than 8-bit oriented units and may significantly enhance the throughput power of personal computers for word processing. Until these are generally available, though, one will have to examine the relative processing speed of 8-bit computers to find the ones with the most efficient designs.

The *keyboard* of a personal computer is very important if one is considering word processing applications. Not all keyboards are easy to use, and because WP work is so heavily keyboard-related, it is vital that this feature receives close examination.

The format and layout of the computer keyboard should closely resemble that of a conventional electric typewriter. In most cases, that's exactly what one will find. The main problems with computer keyboards do not relate so much to layout as to the feel of the device.

Standard computer keyboards—such as those used for data entry terminals or dedicated word processing systems—have a light tactile feel that works very well. These types of devices can actually increase typing speed simply because there is less pressure needed to depress the keys. Most personal computers employ similar keyboards and present no problems. Some lower priced computers—say in the under $500 category—utilize a variety of keyboard designs that don't adapt well to heavy text-entry. Be cautious of the following types of keyboards when dealing with lower-priced personal computers:

- Membrane Keyboards—These don't employ conventional typing keys as we know them, but little buttons that are mounted flush with a flat, vinyl, overlay showing the outline of the keys. One can't type on these; they are mainly used for data entry or programming purposes, and perhaps short text entries.
- Compact Keyboards—Some devices have small, compact keys that are hard to finger because of their small size. Typing is very difficult on these.

Another difference between a DP type of keyboard and that designed specifically for a dedicated word processor is that most WP systems employ special function keys that are reserved for certain, common functions. These might include special keys for such things as cursor control, scrolling, printing, searching, justifying text, centering lines and a whole host of other capabilities. Many small computers come with very simple keyboards devoid of most special function keys. This is because such devices are not really complete without the addition of software to run applications programs, and there is no way the maker of the computer hardware can design special function keys for use with all independently developed software packages. The disadvantage of this is that an application like word processing can truly benefit from the use of dedicated keys for certain functions, and the alternative is to use a complicated set of special key combinations to perform all basic tasks, which is precisely what the users of personal computers have to contend with. The nature and complexity of these commands is really a function of the software package, but the need to approach the machines in this way is the tradeoff for being able to use many different software packages on one brand of computer. Some farsighted small computer manufacturers have anticipated the use of word processing packages on their computers. Consequently, they have designed their keyboards to include as many as 10, 15, and even 22 general purpose function keys whose use may be designated by the user or programmer. We'll discuss some specific key-command problems in our discussion about software itself later in this section.

Finally, the computer itself should be examined to determine its modularity and its facilities for adding

The keyboard of the Apple II Plus is conspicuously lacking in dedicated function keys, which means that most system functions, including some simple cursor controls, are initiated through the use of multiple key commands.

How To Evaluate a Personal Computer for Word Processing Applications

peripheral devices. By modularity, we mean the ability to expand the computer's power by adding more main memory or any other special circuit boards that can enhance the operation of the system. A few personal computers, including Apple and IBM, have been built with expansion slots by which the user can add circuit boards that perform a particular function. The user can then insert circuit boards (or "cards") into a slot as a means of increasing functionality. The computer should also have an adequate number of ports for linking the device to peripherals like printers, disk drives and communication lines.

THE VIDEO DISPLAY

Users are reluctant to spend a lot of money on the CRT that will be used with a personal computer, even though this is the key component that defines one's means of interface with the computer. In the dedicated word processor industry, systems sometimes live or die on the strengths and weaknesses of the display screen alone. While the personal computer customer is not faced with the same wide range of display choice, the screen is an important component that should be examined carefully.

There are three primary areas of concern when evaluating a CRT for word processing: the *format* of the screen, the *color* of the screen and the *way in which characters are formed.* Let's look at these a little closer.

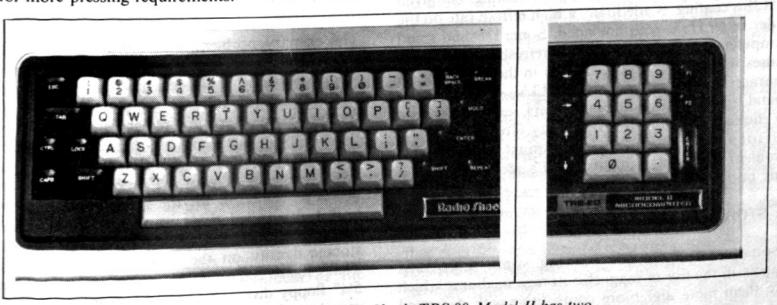
The format of the display screen is going to be somewhat controlled by the individual software package, but a couple of general rules still apply to small computers. The screens are usually partial-page displays which can only show up to 24 lines of text at one time. Part of this may be devoted to showing special command definitions or file information so that there is even less of the display available for showing text itself. Some small computers allow the user to optionally decide whether to display this instructional type of information or use the resulting space for more pressing requirements.

While many personal computers offer 80-column display widths, some like the Apple II and Atari come with 40 columns as the standard width. This means that the maximum number of characters that can be displayed across the width of the screen is 40. Some units, like the Apple II, can be modified with a special circuit board to display 80 columns of characters, which is much more desirable because it allows one to display more text on the given 24 lines of the screen. By comparison, dedicated word processors very often have full page displays capable of showing 60 lines of information on the screen with up to 80 characters per line and can scroll to show additional characters or extra wide lines.

The color of the screen may seem to be a trivial concern at first, but keep in mind that word processing generally requires one to stare at the display for very long periods and that the eyes must be comforted in order to endure this potentially agonizing ritual. Most DP terminals, including those for personal computers, still use the standard black on white color scheme for displaying information. A preferable alternative is to use a screen with green phosphor characters, and luckily these are available for personal computers. The green screen uses less contrast and is easier to gaze at for prolonged periods. Green and amber screens are becoming the de facto standard in the word processing industry. Most CRT terminal vendors that supply the microcomputer industry now offer slightly more expensive display units featuring green phosphor.

The third important feature of the display is the formation of the characters themselves on the screen. There are three basic concerns to be aware of here: upper and lower case character generation, the character resolution, and the refresh rate.

- Upper and Lower Case Characters—The ability of a small computer to display upper and lower case characters is a function of both the character generator of the system and the word processing software. This issue will be discussed in more detail in our comments ▷



The keyboard of the Radio Shack TRS-80 Model II has two groups of keys; the primary, typewriter-like keyboard to the left, and the numeric key cluster to the right with four dedicated cursor control keys.

How To Evaluate a Personal Computer for Word Processing Applications

on software (see The Software), but for now it should be made clear that the ability to show upper and lower case characters on the screen is essential to word processing. The lack of the appropriate character generator may mean an additional hardware expense to purchase a circuit board to upgrade the computer and display. This could cost around $250.

- Character Resolution—Resolution refers to the "fineness" of the characters that appear on the screen. Images formed on CRT's are essentially drawn on the surface of the display by an electron beam. Each character is actually composed of a tiny matrix of dots, and the fineness of this dot matrix will determine the definition of the characters on the screen. The higher the resolution, the easier it is to look at the screen for extended periods. In word processing systems, a high resolution screen is very desirable. In personal computers, however, one is rarely able to find a display that equals the resolution of the typical dedicated word processor. For example, most DP terminals and small computers have a resolution matrix on the order of 5 x 7 or 7 x 7 dot matrix. Most word processors, on the other hand, will range from 7 x 12 to 9 x 16 or higher. Until high resolution graphics are truly affordable for the personal computer, this will remain a serious drawback for using a small computer for word processing.

- Refresh Rates—Another unavoidable problem with inexpensive CRT's for small computers is that their refresh rates are relatively low when compared to most dedicated word processor systems. The refresh rate refers to the electronic process which generates images on the display. As mentioned earlier, the characters are formed by the sweeping action of an electron beam on the screen's inner surface. This image does not remain visible indefinitely, but must be "refreshed" through rapid, periodic sweeps of the beam for a continuous amount of time until the image is moved off the screen by the operator. This rate is largely dependent on the persistency of the screen's phosphor coating, but given that this coating is adequate, a high refresh rate on the order of 60 Hz is recommended. Some DP and small computer terminals have slow refresh rates, which causes more flicker and instability in the formation of characters. More expensive CRT's, such as those found on dedicated word processors, increase this rate to eliminate much of this instability. Today's user of a personal computer, however, must tolerate this problem until better quality CRT's are affordable in this price range.

THE STORAGE MEDIUM

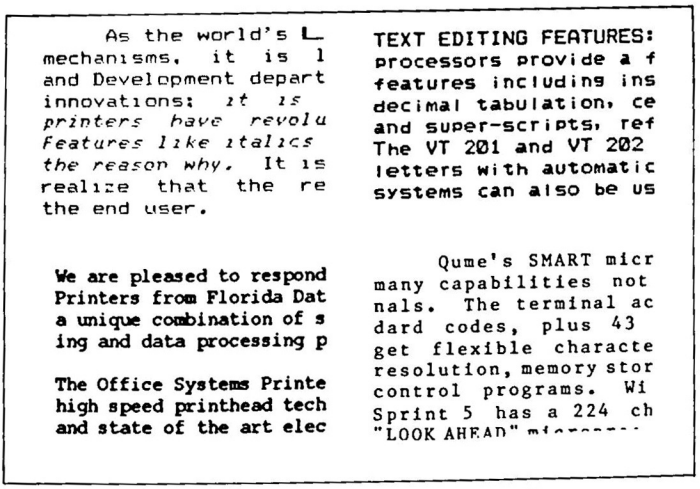
Personal computers are making some important advances in the use of magnetic storage mediums which make them more and more competitive with dedicated word processors all the time. The original personal computers employed cassette tapes for program loading and storage, and while this was better than nothing, it was not a random access medium and the time needed to search for recorded files could be stupefying. Cassette units are still available mostly because they are highly affordable and serve as an adequate medium for learning how to work with a computer. We recommend, however, that diskette drives be used as soon as any user seriously contemplates getting into word processing.

As for diskettes, they come in two basic sizes: 5¼" mini-floppies and 8" standard diskettes. These are the same mediums employed by dedicated word processors, although the WP vendors have taken a few extra steps by adding dual-sided, double-density diskettes to increase storage space. No doubt this advanced technology will someday reach the personal computer user too, but it is more expensive by today's standards and is not generally offered by the small computer vendors.

Most personal computers employ single-density, single-sided 5¼" diskettes. One can usually attach one or two diskette drives to the computer, and two is surely the most convenient configuration if it is affordable because it permits the easy copying and merging of text information from one diskette to another. The standard single-sided, single density 5¼" diskette can hold approximately 40,000 characters, which equates to roughly 25 double-spaced pages of typed material. In reality, most diskettes will be holding something less than that because of the space that must be occupied by program instructions and miscellaneous file management information. In most cases, then, the normal single-sided, single-density 5¼" disk will hold between 15 and 20 pages of text. The standard 8" diskette can hold about twice as much information as the 5¼" variety. In most cases, these space limitations will not be a problem. If you are contemplating writing documents that are longer than 50 or 100 pages, however, you must accept the fact that multiple diskettes must be used to store all of this information and that loading each may involve re-loading of the software program as you switch from one data diskette to the next.

The primary problem with removable diskette storage for personal computers is obviously the lack of large storage capacity. This becomes extremely important if you are contemplating any kind of database application for the system. If you are, remember that unless you want to sub-divide the database between multiple storage diskettes, the extent of your database cannot exceed the storage capacity of your 5¼" or 8" diskette. Fortunately, there is a solution on the market, but it costs about $5,000. It's called the mini-Winchester disk, or "mini-winnie". This is a fixed, 5¼" diskette with very high storage density on the order of 10 to 20 megabytes. That's 100 to 200 times the storage capacity of a standard 5¼" floppy disk. The only disadvantage is cost, which may be twice that of the computer itself. Most people that are willing to spend $8,000 for a total personal computer system for word processing are advised to start looking at the dedicated word processor market as well.

How To Evaluate a Personal Computer for Word Processing Applications



Print Samples from Personal Computer Printers—These samples are reproduced 100% from actual printed copy. Shown are samples from the Epson MX-80FT (matrix). Okidata Microline 80 (matrix in draft mode). Florida Data OSP 120 (overlapping matrix) and the Qume Sprint 5 (daisywheel). Most matrix printers are programmable to feature varying type styles and dot resolutions. While the daisywheel printer (represented here by the Qume example) is thought to be the ultimate in word processing quality output, many special matrix printers such as the Florida Data model are now competing on a quality basis by using overlapping dot matrix technologies.

THE SOFTWARE

Software for personal computers is available from either the makers of the computers themselves or from independent companies that write programs for the most popular brands of computers.

There are literally dozens of word processing packages available for each of the major brands of personal computers, so great care should be taken in selecting the one that best suits one's needs. One should never buy a software package without first trying it out. Even the most popular WP packages may not totally satisfy you; and you should always go shopping with the attitude that out there somewhere exists the perfect package for your applications. Chances are, if you look hard enough, you'll find it. This may require going to a few computer stores to window shop, but your investment in software may be the most important dollars you spend because they will determine the relative usefulness of the computer for your requirements.

There are many reasons why you might select one software package over another. In general, you should consider five basic evaluation criteria: *hardware requirements, functional features* of a package, its *ease of use, documentation* and *price*. Some of the answers to your questions can only be found by getting hands-on experience with the software on your brand of computer. Later in this report we offer an actual test sheet that you can take with you to the computer store to assist you in rating a word processing package for your needs. First, let's look at some general considerations in these five primary areas of concern.

Every software package has specific *hardware requirements* that are listed in its operating manual. Always examine these closely to determine what you will require in the way of hardware to make the package run. The hardware requirements will designate the make and model of computer that the package is designed for, main memory requirements, compatible printers, the number of necessary disk drives and any special circuit boards that may be needed to interpret the program. The latter concern is of supreme importance because the software package may not be written in the same computer language that is native to the computer you are using. If the program is written in something like Cobol or Pascal, you may have to invest in an additional circuit board in order to read it. Other cases that would require the

How To Evaluate a Personal Computer for Word Processing Applications

The IBM Personal Computer offers a sophisticated approach to word processing systems when measured against other personal computers. The keyboard, for example, includes dedicated cursor keys and 10 programmable functions keys that can be employed by software developers to enhance the WP capability of the unit. The price for a full featured system, however, can reach as much as $6,000, which is very near that of many dedicated word processing systems.

purchase of an additional circuit board include the use of an 80-column program on a 40-column computer, the use of an operating system other than that which comes with your computer (i.e. CP/M or Unix), the need to interface the computer with the phone line in order to communicate information and the need for a "time card" for maintaining the time and date in your system. What could one of these additional circuit boards cost you?

Anything from $100 to $500, which is a sizable investment for a small system. If you run into this complication, you may wish to examine other word processing packages that don't require special boards or attachments in order to run on your computer.

The *functional features* of a word processing package require close scrutiny. No two word processing packages are alike, and each has certain strengths and weaknesses that will determine its general usefulness for your needs. The evaluation form included at the end of this report will provide you with some questions and guidelines to use when actually trying a package prior to purchase. In general, however, we can identify a few broad areas of concern.

- Basic Features—Does the package take care of your fundamental WP needs. Look for such functions as basic editing tools (insertion and deletion of single characters, words, lines and paragraphs), word wrap, character searches, search and replace, scrolling through memory (by single lines, paragraphs, screens or pages), column justification, tab sets, margin adjustments, centering, indents, block move, and underlining.

- Cursor Movement—Does the microcomputer provide dedicated keys for moving the screen cursor to the left, right, up and down? (Many require special key commands to move the cursor up and down). Can one return immediately to the beginning or end of the document being worked on?

- Command Structure—How complicated are the commands used by the system? Are they easy to remember? Are they logical? Are they simple (two keystrokes) or complicated (more than two keystrokes)?

- Upper and Lower Case Characters—Assuming that the computer and display have the appropriate character generator, one must ask if the software allows the system to display upper and lower case alpha characters. Not only that, but does it do so through the normal use of the Shift key, as with a typewriter? Believe it or not, this is not always commonly available with small computers. It may require the purchase of an upper/lower case circuit board to control the display, a cost which may be in the range of $250 in some cases. Even then, as with the Apple II Plus, one may have to use the ESC or Command key to create capital letters rather than the normal Shift key.

- Menu-Driven Systems—Most microcomputer WP packages employ menus from which the operator selects system functions. This approach is good for the beginner and saves the user from having to refer to the operator's manual too much, but it's time consuming and even annoying to have to continually use a menu once you have mastered the command structure. A flexible system will permit one to enter commands directly sometimes, bypassing the menu entirely.

- Mailing List Functions—Can the system be used to generate and print mailing labels? If so, can it also combine mailing list information with text that might be used for form letters? Some WP packages require the use of a separate mailing list package to perform these functions.

The functional features of a package, as shown above, inevitably lead one to draw certain conclusions regarding the *ease of use* of a software program. One can best make judgements about the general operation of one package by comparing it to others. In doing so, one should consider such things as:

- The Processing Speed—Is the package fast or slow?

- The Command Structure—Is it logical and easy to remember?

How To Evaluate a Personal Computer for Word Processing Applications

- The Menus—Are they complete and self-explanatory? Can you bypass them once you learn the commands?
- Editing Features—Are they easy to perform?
- Upper/Lower Case Characters—Are they easy to keyboard?
- Cursor Controls—Are they easy to keyboard?

The *documentation* for a software package is as important as the documentation for the computer itself. It should be organized and indexed so that anyone from the beginner to the expert can make practical use out of it. It should contain built-in exercises to acquaint one with the package and all of its applications. It should contain a crib-sheet summarizing all system commands. It should never assume that the reader knows too much. It should be useful, and should contain an exercise you can run while trying a package for the first time. It should not be written in an obscure Slavic language. It should answer all of your questions. The physical appearance of a vendor's documentation may provide a clue as to how useful it may prove to be. Chances are good that typewritten, photostated pages punched with holes and stuffed into a looseleaf binder may not be as effective a teaching tool as an offset-printed instruction manual with color and graphics. It may not be wise to judge a book by its cover, but when it comes to software documentation, it could be a good beginning.

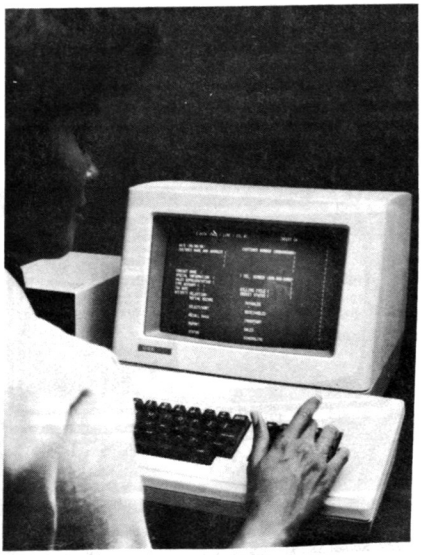
As for the *price* of a word processing package, this may vary widely. Every user has a certain budget to cope with, but it's best to spend as much as you can on software if you must in order to get the right package. Some simple WP programs may run under $100. Most are more like $250 to $500. Price is not always an indication of quality or usefulness, however. You can only determine this by testing pckages.

THE PRINTER

A printer that produces high quality hard-copy can cost more than the personal computer itself. This fact can be very discouraging to those who demand typewriter-quality output for their word processing applications. To get this quality, one has to buy a daisywheel-type, full-character printer. This will drive the total system cost up dramatically, but there are some developments in the market that indicate that even daisywheel printers will become more and more affordable in coming years. What do we mean by affordable? The traditional daisywheel printer for a dedicated word processing system—the models made by Qume and Diablo, for example—generally cost between $3,000 and $5,000. These models are heavily loaded with features such as high-speed (45 and 55 cps) printout, graphics features, metal daisywheels and so forth. With the advent of personal computing, many companies are now offering stripped-down, slower (25 cps) versions of their printers for about $2,000. This trend is very good for the home computer user, but still amounts to a sizable outlay of cash.

What are the alternatives? There aren't any for true, full-character printing that offers the quality of a typewriter. If one is willing to settle for something less in print quality, there are a couple of attractive options.

Matrix printers form characters as a series of dots created by the action of tiny pins against an ink ribbon. Each character is composed of a "matrix" of dots, and because of this, the characters never truly attain the kind of quality associated with full-character impact printers. The character resolution—or dot matrix—may vary from a basic 7 x 7 or 7 x 9 to an overlapping matrix of dots for high quality image formation in the range of 24 x 9 dots per character. Many matrix printers are offered with multiple speeds and resolutions so that one may use a draft or proofing speed for rapid output, and finer resolutions for final copy. In terms of speed, matrix printers far eclipse their daisywheel counterparts. Daisywheel printers for the home computer market generally run at about 25 cps and certainly no more than 55 cps for a high-speed model. That equates to about 1 to 2 minutes per page. Matrix printers, however, are much faster and run at speeds from 160 to 600 cps. That's more like 8 or 10 pages per minute for a unit that runs around 180 cps. In terms of price, a good matrix printer for a personal computer shouldn't run more than $1,000, with most of the popular models falling in the $750 to $900 range. There is a very strong case for using matrix printers instead of daisywheel printers unless the bulk of one's output is going to outside recipients. If the need for true typewriter-quality output is minimal, it may be less ▷



The Xerox 820 Personal Computer

How To Evaluate a Personal Computer for Word Processing Applications

expensive and reasonable to manually type final copies of rough drafts done on a matrix printer.

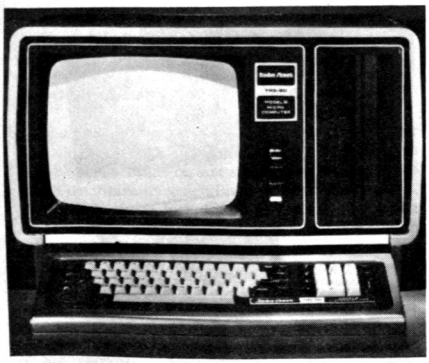
Other factors to consider when examining matrix printers include the following:

- Does it print lower case characters with true descenders? A descender is the lower part of a character like a "y" or a "g" which is printed below the invisible line on which a sentence is printed. If a printer doesn't print true descenders, it is probably cramming them up above this invisible line, which makes for uncomfortable reading and the confusion of characters like "a" with "g".

- Does the printer have forms (tractor) *and* friction feed for single sheets? Both are preferable. Friction feed allows you to print onto custom letterhead or other odds and ends like envelopes.

- Does the printer also handle special graphics? An added feature of many matrix printers is the ability to print special graphics like bar charts, graphs and custom logos or other artwork that the user can create.

A second type of printer that one can buy for a personal computer is the *thermal printer*. While thermal printers are by no means capable of producing typewriter quality print, they are the least expensive variety of personal computer printer. One has to decide whether or not the print quality is sufficient for one's word processing needs. Generally speaking, thermal printers have undesirable print quality for word processing due to the silvery paper that must be used and the poor resolution of the dot-matrix characters. The paper itself is special and is more expensive than plain paper that can be used with matrix and daisywheel machines. Thermal printers can, however, handle graphics printing; and they usually cost under $500, which makes them affordable for the average personal computer buyer. We would not recommend them for word processing, unless the output was for personal use and not intended for distribution to other people.



The Radio Shack TRS-80 Model II, which can be used with Tandy's own Scripsit word processing package.

THE DOCUMENTATION

Every separate component of a personal computer system comes with some technical literature and operator instructions that we jointly label as documentation. Bad documentation can make a good system seem impossible to fathom. The question is, however, would you refuse to buy a particular system merely because the documentation was poor? Given the variety of products out there to choose from, you can probably afford to be picky. Just remember that if the operator's instructions are incomprehensible, your productive use of the equipment will be narrowed to a bare minimum until you have many long hours of experience with the system. Poorly written documentation may also indicate poorly written software or poorly designed hardware.

Here are some things to look for when examining documentation:

- Is it written for the beginner or the expert? Do you consider yourself to be a beginner or an expert?

- How does it rate when compared to those of competitive products? By making comparisons, you can judge which ones are better done than others.

- Are the instructions clear and precise? Do they accurately cover every step necessary to perform a system function?

- Is there a section covering possible problems you may encounter? Is there a phone number you can call for advice? If so, call it to make sure the company is still in business (especially with software packages).

- Is the documentation well illustrated?

- Is the documentation well indexed?

- Does the documentation answer *all* of your questions?

SERVICE & SUPPORT

An area of prime importance when obtaining any system is support. We define support as any type of tangible effort on the part of the vendor, store, or dealer to guarantee your continued productivity when using their equipment regardless of whether it has been purchased or leased. This may include training personnel, providing software enhancements, and being available later as questions arise.

When you buy a dedicated word processor, the vendor will provide training both on the operator and supervisory levels by highly qualified Customer Service Representatives. There may or may not be a charge for this training; however, the point is, training is available so

How To Evaluate a Personal Computer for Word Processing Applications

that the purchaser is assured that operators will be well trained in system functions. The training usually includes a certain amount of follow-up support as questions arise. Further, this training is also available should it be necessary to train new or backup operators. When you buy (leases are not always obtainable) a computer, the store or dealer from which you purchased it will not usually do as thorough a job. Training may last for as little as a half an hour in many of the major computer retail stores. This matter fluctuates wildly from very good to almost nonexistent. Careful investigation of this area will prove worthwhile.

In this fast paced industry, vendors are constantly improving the quality and speed of their product with software enhancements.

Most dedicated word processing vendors will automatically send you the latest version of their operating system and any improvements to software that you have purchased or leased from them. They'll not even charge for this service. Small computer vendors, stores, and dealers will almost *never* provide you with free software enhancements.

Many dedicated word processing companies provide a telephone consultation service that allows any customer to ask a question of a knowledgeable support representative. Some vendors even operate this service on a 24 hour a day basis and provide a toll-free number. Very few small computer vendors provide this type of service directly to end users. Not all small computer vendors even provide such a service to their dealers! Customer support may range from none to very good depending upon the skill and technical competence of the store or dealer from which you buy your personal computer. If the dealer employs a resourceful technician, the odds are your questions will be answered when he or she is around.

These are some of the dramatic support differences that exist when choosing between a dedicated word processor and a microcomputer driven with word processing software. Again, we wish to emphasize that these are generalizations and may not always apply.

Two small computer vendors must be commended for outstanding support action. Osborne Computer Corporation recalled and replaced faulty keyboards without charge; IBM sent all their customers who purchased Visicalc (a financial planning program) for the Personal Computer, a new, more powerful version without charge. Some of the most reputable software vendors, like Microsoft and Visicorp, have made moves to provide free upgrades of software to their users. These actions will hopefully trigger other small computer vendors to act with equal responsibility. The quality of support we look for in adapting a small computer for word processing use is only now evolving. Regrettably, our experience tells us, however, that these support elements must be carefully factored into the total cost of any buying decision.

The Atari 800, a low-priced personal computer that offers some basic text editing functions when used with the Atari word processing applications program.

TRENDS

Personal computers continue to make price/performance breakthroughs. The cost of microprocessors, memory chips, and other key hardware parts which compose a microcomputer continue to drop as the equipment becomes more standardized and powerful. The economy of mass production and marketing is starting to prevail.

Many microcomputer vendors are making their systems with word processing adaptability in mind. IBM, Monroe, and Sanyo are now offering small computers with enough function keys to satisfy most text processing requirements.

Software documentation is improving rapidly. Such dramatic strides are being made in this area that very shortly all major software suppliers will either provide top quality documentation or simply no longer be major suppliers. Features like bold printing, spelling verification, and underlining—unheard-of concerns just a year ago—are now available in an increasing number of packages. Sophisticated sorts and document handlers are surfacing.

An interesting development to be monitored closely is the use of color in small computers for text applications. NEC, Monroe, Apple III, IBM and others, provide RGB (red, green, blue) output which allows 80-column wide text to be displayed with great clarity in *color*.

When accompanied by a compatible monitor, the resulting image displayed is decidedly more resolute than its monochrome video counterpart. Thus, future word processing packages may highlight editing functions (e.g.

How To Evaluate a Personal Computer for Word Processing Applications

misspellings, cursor movement, bold print, etc.) with different colors. Ergonomically, a user may have the option of selecting a myriad of possible color combinations that may be less straining to the eye.

We hope some of these trends will challenge the dedicated word processing vendors to greater innovation and lower pricing. Already, many of these vendors are providing independent operating systems, Basic programming language interpreters/compilers, and accounting application options, as the differences between their systems and personal computers become more blurred each passing day. All these developments prove that one way or another, using a personal computer as a word processor is an effective low-cost office appliance alternative.

WHEN DOES A PERSONAL COMPUTER MAKE A GOOD WORD PROCESSOR?

This report has spent many pages discussing the various problems of personal computers when used mainly as word processors. In an indirect way, we have been trying to imply that there are also many circumstances which make the personal computer an ideal choice for word processing. If any of the following apply to your situation, you may want to consider a micro as opposed to a dedicated WP device.

- If you have less than $5,000 to spend.
- If you also need a computer to perform other functions, like general ledger, payroll, inventory, etc.
- If your total word processing output is not considered to be high volume and can be handled comfortably by one typist.
- If you are not going to need massive archival storage.
- If your word processing applications are fairly typical: reports, documents, mailing lists, letters, memos, etc. You won't be happy if you need to handle complicated tables, statistical charts with many tabs, and other technically oriented endeavors.
- If you want a portable device that can be used at home or at work.
- If you don't really plan on expanding to a dedicated word processing system from companies like IBM, NBI, Xerox, Wang and the many others. If your sights are set on a larger word processing operation in the future, don't do it by collecting personal computers, start with electronic typewriters that can be expanded into word processors as your needs develop.

Another interesting phenomenon in the market is the marriage of personal computer technology with that of the dedicated word processor and electronic typewriters. It is possible, for example, to buy an electronic typewriter that can double as both a typewriter for a secretary and as an output device for a personal computer used by someone else. This kind of approach makes perfect sense for the office environment with a limited budget, and it does so while remaining flexible to future needs.

TESTING A WORD PROCESSING SYSTEM—A WORKSHEET

To assist the user in selecting a microcomputer system for word processing applications, we have developed an evaluation form found at the end of this report. This form contains questions that you should ask regarding a system's hardware and software features, as well as about vendor service and documentation. We encourage you to take this form to the computer store when you sit down for a hands-on demonstration of a system, and use it to weigh your overall impressions of the personal computers you have seen.

The form consists of a series of questions and is designed to allow you to check-off responses in a quick and easy manner. We encourage you to make photocopies of this form for your personal use while evaluating numerous personal computer systems for word processing.

All of your basic concerns are summarized on this questionnaire, and by using this form to evaluate a personal computer to meet your WP needs, you can rest assured that you've done your homework in the process of making an important investment.□

DATAPRO RESEARCH CORPORATION

EVALUATION WORKSHEET: PERSONAL COMPUTERS FOR WORD PROCESSING APPLICATIONS

This form is designed to be used by the prospective buyer of a personal computer for word processing applications. It contains questions on all major areas of concern when evaluating a system, and can be used to compile comparative data on competitive systems and software. Use this form during a hands-on demonstration at the computer store or vendor's office, and answer the questions as you test the system.

Name of Computer Store _____
Name of Sales Representative _____
Telephone of Store _____
Personal Computer Make & Model _____
Name of Software Package Tested _____

Total Package Price (including computer, display, disk drives, software, printer, interface accessories and any modification needs):
_____

GENERAL SYSTEM FEATURES

Main Memory Size (48K minimum is recommended for word processing) _____
Storage Diskettes
Size: ☐ 5¼" or ☐ 8"
Type ☐ Single-sided, single density; ☐ single-sided, double density;
☐ double sided, single density, ☐ double sided, double density
Number: ☐ One drive; ☐ Two drives; ☐ Other. _____
Capacity: ☐ 100K char./disk (50 pages); ☐ 200K char./disk (100 pages),
☐ 300K char./disk (150 pages).

☐ Other: _____

THE KEYBOARD: ☐ Standard typewriter style ☐ Typewriter style, but with function keys.

Dedicated cursor keys for: ☐ up; ☐ down; ☐ right; ☐ left; ☐ home.

The keyboard is: ☐ cable connected/detached, ☐ integral.

☐ Other: _____

THE DISPLAY:

Make & Model: _____
Color (i.e. green on grey, black on white, etc.): _____
Display Column Width: ☐ 40 columns ☐ 80 columns ☐ 80 columns with modification.

☐ Other: _____
Other Controls (check all that apply) ☐ Brightness ☐ Contrast

☐ Tilt ☐ Rotate ☐ Detached screen.

Upper & lower case characters displayed? ☐ Yes; ☐ No; ☐ Optional with modification.

DOCUMENTATION EVALUATION

Carefully examine and use the computer and software manuals during the demonstration of the system. Ask the following yes/no questions about each set of system manuals and place your response in the appropriate column below.

	Computer Manual	Software Manual
Does it have an index?	_____	_____
Does it have a section for beginners?	_____	_____
Does it have a glossary of terms?	_____	_____
Is it illustrated with photos and diagrams?	_____	_____
Does it contain a summary of all commands?	_____	_____
Does it answer all of your questions?	_____	_____

Other comments:

How To Evaluate a Personal Computer for Word Processing Applications

WORD PROCESSING SOFTWARE EVALUATION

In examining the editing features and general functions of the word processing software, try the following exercises and note your opinion of the system's ease of use in the appropriate column below.

THE EXERCISE:	Simple to Do	Somewhat Hard To Do	Very Difficult	Can't Be Done
1. Start a text file and enter some paragraphs	1. ___	___	___	___
2. Insert characters, words and sentences	2. ___	___	___	___
3. Delete characters, words and sentences	3. ___	___	___	___
4. Move a block of text	4. ___	___	___	___
5. Delete a block of text	5. ___	___	___	___
6. Center a line	6. ___	___	___	___
7. Underline a word or sentence	7. ___	___	___	___
8. Indent a paragraph	8. ___	___	___	___
9 Perform a character-string search	9 ___	___	___	___
10. Perform global search-and-replace automatically	10. ___	___	___	___
11. Create tabular material	11. ___	___	___	___
12. Change the margin settings	12. ___	___	___	___
13. Change the length of the text page	13. ___	___	___	___
14 Right-justify the text	14. ___	___	___	___
15 Save (or store) a file on diskette	15. ___	___	___	___
16. Revise a file on diskette	16. ___	___	___	___
17. Merge two files from the same diskette	17. ___	___	___	___
18 Merge two files from different diskettes	18. ___	___	___	___
19 Print a copy of a file onto paper	19 ___	___	___	___
20. Print part of a file onto paper	20. ___	___	___	___

Clarify the kind of service and support you can expect from the computer dealer by asking the following questions.

What is the equipment warranty? _____
Is the software warranted? _____
What type of training is offered? _____

Is there a Hot-Line telephone number for handling system questions? _____
Is this Hot-Line toll-free? _____

Is equipment service handled on the customer's site? _____ Is there a pick-up servic
for equipment that must be repaired off-site? _____

What are the service charges? _____